Bioactive HAw Composite Ceramic Bone Substitutes

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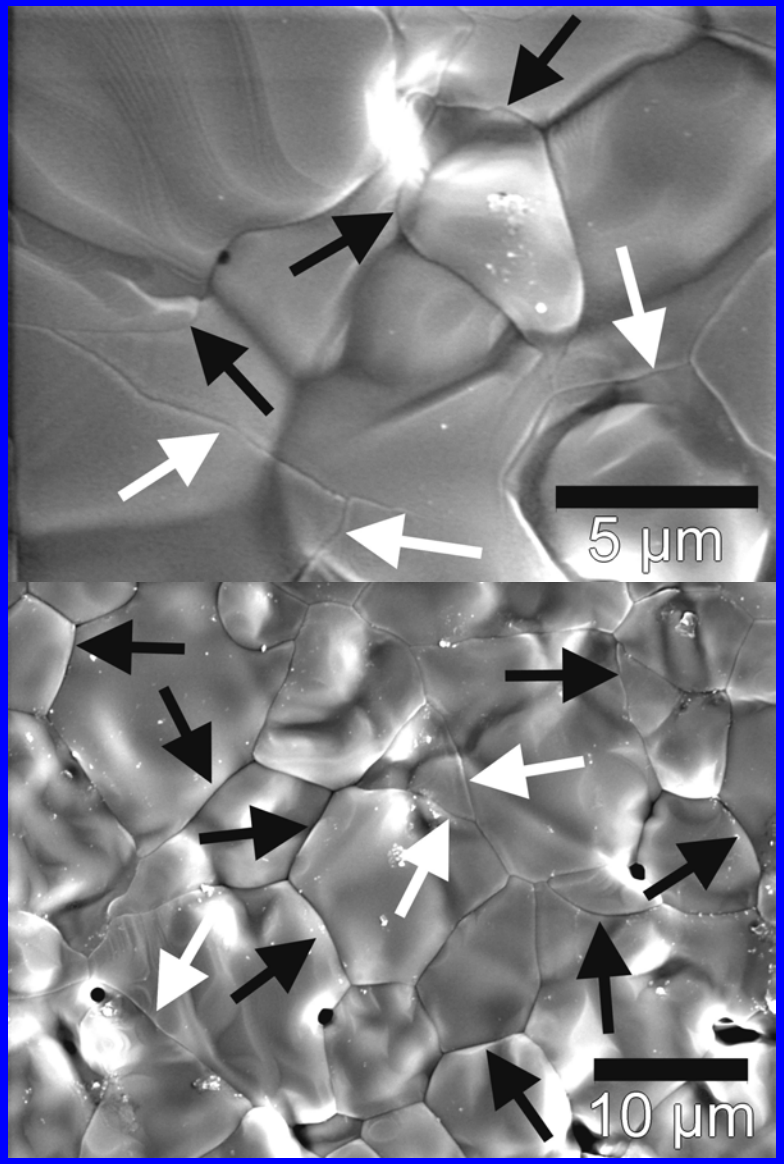
Calcium phosphates including hydroxyapatite (HA) are widely studied as an artificial bone material. However, mechanical properties of ceramics are a function of thermal expansion anisotropy induced stresses and microcracking. Researchers have found that such microcracks are important in repairing damaged bone. Our study presents the first clear evidence of microcracking in HA surfaces (shown in the scanning electron micrographs at right). The microcracks cross the grains (white arrows), run along the grain boundaries (black arrows) and some of the microcracks that transverse the grains appear to be connected to the grain boundary microcracks.

Hence, the similarities between microcracking in HA and in the normal bone repair process is important in designing better artificial bone materials made from HA.



Undergraduate Research Benefits Biomedical Technology

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- **Undergraduates fabricate HA samples [M. Griffin (top)] and then test those artificial bone scaffolds for bone cell attachment [N. Theyyuni (bottom)]**

- **Research recently presented includes:**

IO Smith, MJ Baumann, LR McCabe and MA Griffin,"MC3T3-E1 OBs are a Suitable Substitute for Primary OB Behavior in terms of ζ-potential analysis of HA and β-TCP In Vitro", presented at the 2004 World Biomaterials Meeting, Australia, May 2004.

J. Xie, M. J. Baumann and L.R. McCabe, "Osteoblasts respond to hydroxyapatite surfaces with immediate changes in gene expression", accepted for publication in J Biomed Mater Res, June 2004.

M. Hossain, C. S. Ontiveros, M. J. Baumann and L. R. McCabe, "Kinetics of HGF adsorption to hydroxyapatite surfaces with immediate changes in gene expression", accepted for publication in Biomaterials, July 2004.

E. D. Case, I.O. Smith and M. J. Baumann, "Microcracking and porosity in calcium phosphates and the implications for bone tissue engineering", Mat Sci Eng A, in print, August 2004.